

U.S. Patent Application Serial No. 10/665,204
Amendment filed February 21, 2006
Reply to OA dated November 18, 2005

REMARKS

Claims 1 - 13, 15 and 16 have been canceled without prejudice or disclaimer. The specification and claim 14 has been amended in order to more particularly point out, and distinctly claim the subject matter to which the applicants regard as their invention. The applicants respectfully submit that no new matter has been added. It is believed that this Amendment is fully responsive to the Office Action dated November 18, 2005.

Claims 14 and 17 - 23 remain pending in this application.

The Examiner objects to the drawings for not showing the claimed feature of “a semiconductor optical waveguide path,” as recited in claim 10. The applicants respectfully request reconsideration of this drawing objection.

As indicated above, claim 10 has been canceled; thus, the outstanding objection to the drawings is now moot. Accordingly, the withdrawal of the outstanding objection to the drawings is in order, and is therefore respectfully solicited.

U.S. Patent Application Serial No. 10/665,204
Amendment filed February 21, 2006
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The Examiner objects to the specification because the composition of the buffer layer of Claim 8 is not disclosed in the specification. Also, the examiner objects to claim 8 because the limits for x and y of the material of the buffer layer is incorrectly written. The applicants respectfully request reconsideration of the objection to the specification and rejection of claim 8.

As indicated above, claim 8 has been canceled without prejudice or disclaimer. Thus, the outstanding objection to the specification and rejection of claim 8 are now moot. Accordingly, the withdrawal of the outstanding objection to the specification and rejection of claim 8 is in order, and is therefore respectfully solicited.

As to the merits of this case, the Examiner rejects claim 16 under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,998,851 to Nishikata. This rejection is now however moot because of the cancellation of claim 16.

In view of the above, the withdrawal of the outstanding anticipation rejection under 35 USC §102(b) based on U.S. Patent No. 5,998,851 to Nishikata is in order, and is therefore respectfully solicited.

U.S. Patent Application Serial No. 10/665,204
Amendment filed February 21, 2006
Reply to OA dated November 18, 2005

Also, the Examiner rejects claims 17 - 20 under 35 USC §102(e) as being anticipated by U.S. 2003/0211648 to Buchanan. The applicants respectfully request reconsideration of this rejection.

This rejection is similar to the rejection, in view of Buchanan, found in the previous Office Action, with an additional comment on the amendment which added “the semiconductor intermediate tunneling layer allowing electrons to pass therethrough to the buffer layer due to a tunnel effect”. The examiner comments that such addition is a desired result rather than a structural limitation.

The Examiner alleges that in Buchanan, 4g corresponds to the claimed buffer layer, 4e corresponds to the claimed light absorption layer, and 4f corresponds to the claimed high-concentration semiconductor intermediate tunneling layer.

At [0115] of Buchanan, it is disclosed that layers 4c - 4g form the LED of the device, with layers 4a and 4b being the N-QWIP.

As pointed out in the applicants' Response to the previous Office Action, layer 4e cannot be the claimed light absorption layer and layer 4f cannot be the claimed high-concentration semiconductor intermediate tunneling layer. Based on the above, the claimed invention is not

U.S. Patent Application Serial No. 10/665,204
Amendment filed February 21, 2006
Reply to OA dated November 18, 2005

anticipated by the teachings of Buchanan.

In view of the above, the withdrawal of the outstanding rejection under 35 USC §102(e) based on U.S. 2003/0211648 to Buchanan is in order, and is therefore respectfully solicited.

The Examiner further rejects claims 1 - 13 and 15 under 35 USC §103(a) as being unpatentable over admitted prior art (APA) in view of Takahashi (JP '082). However, claims 1 - 13 and 15 have been canceled; thus, the outstanding rejection of these claims is now similarly moot. Accordingly, the withdrawal of the outstanding rejection under 35 USC §103(a) based on admitted prior art (APA) in view of Takahashi (JP '082) is in order, and is therefore respectfully solicited.

The Examiner also rejects claims 1, 6, 7, and 9 - 15 under 35 USC §103(a) as being unpatentable over Ishihara (JP 63-124475) in view of Uchida (U.S. 2001/0048118). The applicants respectfully request reconsideration of this rejection.

As noted above, claims 1, 6, 7, 9 - 13 and 15 have been canceled; thus, the outstanding rejection of these claims is now moot.

As to the remaining claim 14, the Examiner alleges that Ishihara discloses all of the claimed elements, except for a semiconductor intermediate layer, but alleges that Uchida discloses such layer.

U.S. Patent Application Serial No. 10/665,204
Amendment filed February 21, 2006
Reply to OA dated November 18, 2005

The Examiner further alleges that in Figs. 1 and 9 of Uchida, layer 3a corresponds to the claimed light absorption layer, layer 4 corresponds to the claimed buffer layer, and that layer 3c corresponds to the claimed semiconductor intermediate layer.

It appears as though the Examiner is misinterpreting the disclosure of Uchida as layers 3a, 3b, and 3c make up the photodetection layer 3. Layer 3c provides an intermediate band gap to layers 3a and 3b of the photodetection layer 3, and such structural arrangement is repeated 18 times. Layer 3c is not located between the buffer layer and the light absorption layer, as presently claimed.

In view of the above, the withdrawal of the outstanding obviousness rejection under 35 USC §103(a) based on Ishihara (JP 63-124475) in view of Uchida (U.S. 2001/0048118) is in order, and is therefore respectfully solicited.

Moreover, the Examiner rejects claims 17, 21, and 22 under 35 USC §103(a) as being unpatentable over Ajisawa et al. (U.S. Patent No. 5,825,047) in view of Vilela (U.S. Patent No. 5,800,630). The applicants respectfully request reconsideration of this rejection.

It is respectfully submitted that the response submitted by the applicants on pages 13 and 14 of their Response filed July 15, 2005 has not been addressed by the Examiner in the outstanding Action. In the applicants' last response, it was submitted that Ajisawa teaches an optical

semiconductor device, more specifically, an optical modulator. As acknowledged by the Examiner, Ajisawa's clad layer 65 is not the tunneling layer.

The Examiner then relies on Vilela and states that Figure 4 thereof shows a light-receiving device and the third layer from the bottom of the device is a high-concentration semiconductor intermediate tunneling layer. However, the device taught by Vilela is not the light-receiving device and is nothing less than a tunneling diode in which the p^{++} layer and the n^{++} layer are directly joined to form the tunneling junction. The third layer has a higher impurity concentration than the second layer from the bottom, while the fourth layer laminated on the third layer has a high impurity concentration of the opposite type and no light absorption layer is provided.

However, the teachings of Vilela of relative impurity concentrations among its layers (as shown in Vilela's Figure 4) do not change the fact that Ajisawa was not and will still not be concerned with any band discontinuity between its buffer layer and its light absorption layer, as discussed above. It is further noted that Vilela's third layer from the bottom (considered by the Examiner to reflect the applicants' claimed tunneling layer) is not interposed between a buffer layer and a light absorption layer. Thus, Vilela is similarly not concerned with tunneling; and a person of ordinary skill in the art would not find any reason to combine the teachings of both references to meet the applicants' claimed invention.

U.S. Patent Application Serial No. 10/665,204
Amendment filed February 21, 2006
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Accordingly, a person of ordinary skill in the art would not have found the applicants' claimed invention, as now set forth in claim 17 (and claims 21 and 22 that depend therefrom), obvious under 35 USC §103 based on Ajisawa in view of Vilela. Thus, the withdrawal of the outstanding rejection under 35 USC §103 based on Ajisawa in view of Vilela is in order, and is therefore respectfully solicited.

Lastly, the Examiner rejects claim 23 under 35 USC §103(a) as being unpatentable under Watanabe (JP 6-90016) in view of Vilela. The applicants respectfully request reconsideration of this rejection.

Here, the Examiner similarly does not address the applicants' comments, as set forth on page 14 of the applicants' July 15, 2005 Response. As discussed in the applicants' July 15, 2005 Response, the Examiner's reliance on Watanabe's relative impurity concentrations does not resolve its drawbacks or deficiencies, as in the Ajisawa - Vilela pairing discussed above, in not being concerned with trying to resolve the problem of band discontinuity between a buffer layer and a light absorption layer. Thus, a person of ordinary skill in the art would not have found the applicants' claimed invention, as now set forth in claim 23, obvious under 35 USC §103 based on Watanabe in view of Vilela.

U.S. Patent Application Serial No. 10/665,204
Amendment filed February 21, 2006
Reply to OA dated November 18, 2005

Accordingly, the withdrawal of the outstanding obviousness rejection under 35 USC §103 based on Watanabe in view of Vilela is in order, and is therefore respectfully solicited.

In view of the aforementioned amendments and accompanying remarks, claims, as amended, are in condition for allowance, which action, at an early date, is requested.

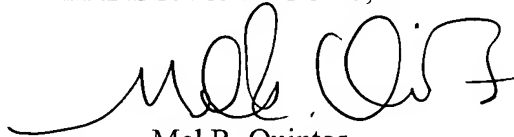
If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

U.S. Patent Application Serial No. 10/665,204
Amendment filed February 21, 2006
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In the event that this paper is not timely filed, the applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper to Deposit Account No. 01-2340.

Respectfully submitted,

ARMSTRONG, KRATZ, QUINTOS,
HANSON & BROOKS, LLP



Mel R. Quintos
Attorney for Applicants
Reg. No. 31,898

MRQ:lrj:ipc

Atty. Docket No. **031188**
1725 K Street, N.W.:
Washington, D.C. 20006
(202) 659-2930



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